

Claims

1 1. A cathode for a metal air electrochemical cell,
2 the cathode comprising
3 (a) a first layer including about 30% to about 70%
4 of an organic polymer by weight;
5 (b) a second layer including about 10% to about 30%
6 of an organic polymer by weight; and
7 (c) a catalyst,
8 wherein the first layer and the second layer contact
9 each other at a textured interface.

1 2. The cathode of claim 1, wherein the cathode
2 includes from about 0.1% to about 20% of the catalyst by
3 weight.

1 3. The cathode of claim 1, wherein the first layer
2 includes a catalyst.

1 4. The cathode of claim 3, wherein the second layer
2 includes a catalyst.

1 5. The cathode of claim 4, wherein the first layer
2 and the second layer contain different catalysts.

1 6. The cathode of claim 1, wherein the catalyst is
2 selected from the group consisting of manganese oxides,
3 precious metals, metal heterocycles, and cobalt, and
4 mixtures thereof.

1 7. The cathode of claim 6, wherein the catalyst is
2 manganese dioxide.

1 8. The cathode of claim 7, wherein the cathode
2 further comprises a silver catalyst.

1 9. The cathode of claim 1, wherein the textured
2 interface is coated with a catalyst.

1 10. The cathode of claim 9, wherein the first layer
2 includes a catalyst that is different from the catalyst
3 coating the interface.

1 11. The cathode of claim 10, wherein the catalyst
2 coating the interface is selected from the group consisting
3 of platinum and silver catalysts.

1 12. The cathode of claim 11, wherein the catalyst
2 coating the interface is a platinum catalyst.

1 13. The cathode of claim 12, wherein the cathode
2 contains less than about 3% by weight of the platinum
3 catalyst.

1 14. The cathode of claim 1, wherein the organic
2 polymer is polytetrafluoroethylene.

1 15. A metal air electrochemical cell comprising:
2 an anode including an anode can and an anode gel;
3 a cathode, the cathode including a cathode can
4 having at least one air access port and containing a cathode
5 structure, the anode can and cathode can being assembled to
6 form a cell; and

7 a separator electronically separating the anode and
8 the cathode positioned between the anode gel and the cathode
9 structure;

10 wherein the cathode structure comprises (a) a first
11 layer including about 30% to about 70% of an organic polymer
12 by weight; (b) a second layer including about 10% to about
13 30% of an organic polymer by weight; and (c) a catalyst,
14 wherein the first layer and the second layer contact each
15 other at a textured interface.

1 16. A method of making a cathode for an
2 electrochemical cell, the method comprising combining carbon
3 with AgMnO_4 to form a mixture, then preparing a cathode with
4 the mixture.

1 17. The method of claim 16, wherein the
2 electrochemical cell is a metal air cell.

1 18. The method of claim 16, wherein the
2 electrochemical cell is an air-assisted alkaline cell.

1 19. The method of claim 16, further comprising
2 combining the carbon and the AgMnO_4 with PTFE to form the
3 mixture.

1 20. The method of claim 16, wherein the method
2 comprises combining carbon with less than about 5 percent by
3 weight AgMnO_4 to form the mixture.

1 21. A cathode for an electrochemical cell, wherein
2 the cathode comprises manganese and silver, and wherein the
3 cathode is substantially free of potassium.

1 22. The cathode of claim 21, wherein the cathode
2 comprises less than about 7 percent by weight silver.

1 23. The cathode of claim 21, wherein the cathode
2 contains less than about 3 percent by weight silver.

1 24. A cathode for a zinc air cell that has a
2 current density of at least 70 mA/cm² at a voltage of -0.25
3 volts, versus a Hg/HgO reference.

1 25. The cathode of claim 24, wherein the cathode
2 has a current density of at least 80 mA/cm² at a voltage of
3 -0.25 volts, versus a Hg/HgO reference.

1 26. The cathode of claim 25, wherein the cathode
2 has a current density of at least 90 mA/cm² at a voltage of
3 -0.25 volts, versus a Hg/HgO reference.

1 27. The cathode of claim 26, wherein the cathode
2 has a current density of at least 100 mA/cm² at a voltage of
3 -0.25 volts, versus a Hg/HgO reference.

1 28. A cathode for an electrochemical cell, the
2 cathode comprising a catalyst, wherein the cathode is
3 prepared using AgMnO₄ as a catalyst precursor.